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TITLE

**TRANSMISSION AND/OR RECEPTION DEVICE WHICH IS INTENDED  
TO BE MOUNTED TO A VEHICLE WHEEL AND A HOUSING FOR ONE  
SUCH DEVICE**

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a transmission and/or reception device which is intended to be mounted to a vehicle wheel, and also to a housing for such a device.

Related Art

[0002] Car manufacturers are tending to fit the wheels or tires of vehicles with members that serve to provide information about the tires to a vehicle computer.

[0003] Amongst possible members, there are to be found pressure sensors, temperature sensors, and devices for identifying tires, for example. Such members are coupled to transmission and/or receiver devices.

[0004] It is known to make use of radio technology to enable the member to communicate with the computer. The same technology can also be used for transmitting energy to the member from a fixed point of the vehicle.

[0005] To this end, a fixed antenna is provided on the vehicle. It is connected by electric cables to the computer and/or to an electrical power supply, and the

transmission and/or receiver device is also connected to an antenna which is carried by the wheel or the tire.

**[0006]** Such communications technology raises the problem of the active area required for proper operation of the antenna, which requires an antenna to be provided that is rather large. Unfortunately, the transmission and/or reception device is generally integrated with the sensor in a common housing which is miniaturized as much as possible, firstly for reasons of weight and secondly to avoid interfering with fitting the tire on the wheel. As a result, it is necessary to make use of an external antenna that is separate from the housing. This leads to several drawbacks, of which the following can be mentioned in particular: manufacturing costs, stock management, assembly difficulties, reliability, and overall weight.

#### SUMMARY OF THE INVENTION

**[0007]** The present invention seeks to provide a transmission and/or reception device that does not require an antenna that is separate from the housing.

**[0008]** The present invention provides a transmission and/or reception device for mounting on a wheel of a vehicle, said device comprising a housing and being characterized in that it includes an antenna carried on an outside face of said housing, said antenna consisting of a cable which is wound around the housing.

**[0009]** So, the section of the housing forms a solenoid, thereby constituting an antenna that is particularly suitable for the intended application.

**[0010]** In particular, it is preferable for the housing to be shaped in such a manner as to be positioned on the wheel so that the orientation of the solenoid is parallel to an ortho-radial axis of the wheel, i.e. an axis that is at right angles to a radius and to the axis of the wheel.

**[0011]** The device of the invention takes advantage of the presence of a housing which, even though small in volume, nevertheless provides a section of non-negligible area, suitable for providing an area that is sufficient for the antenna.

**[0012]** In a particular embodiment, the outside face of the housing is shaped to protect the antenna.

**[0013]** This protection is of use particularly while a tire is being mounted on the wheel, during which operation the bead of the tire slides in the assembly groove during inflation and rubs against the housing engaged in a corner of said groove.

**[0014]** In a particular embodiment, the outside face of the housing has grooves suitable for receiving the cable. Such grooves can participate both in positioning and in protecting the cable.

**[0015]** A transmission and/or reception device of the invention may further comprise one or more of the following characteristics:

- at least some of the grooves are shaped to receive the cable fully in such a manner that the cable is protected against possible rubbing by the ridges between said grooves;

- the grooves are formed by spaces left empty between ribs formed on the outside face of the housing;

- the device has an outer protective film covering the antenna carried by the outside face of the housing, the film being made, for example, out of polypropylene, polyphenylene sulphide (PPS), or polyamide;

- the film is made of a heat-shrink plastics material, for example out of polyethylene or polytetrafluoroethylene (PTFE) (Teflon);

- the device comprises has and outer protective film made by moulding; and in its housing, the device includes pressure-measuring means for measuring the pressure that exists inside a tire mounted on the wheel carrying said device.

**[0016]** The invention also provides a housing for a transmission and/or reception device for being carried by a vehicle wheel, said device including an antenna, the housing being characterized in that it has an outside face shaped to support and protect the antenna and in that the antenna of the device consists of a cable wound around the housing to form a solenoid.

**[0017]** A housing of the invention may further comprise one or more of the following characteristics:

- the housing is shaped to be positioned against a wheel in such a manner that the solenoid is oriented along an ortho-radial axis of the wheel;

- the outside face of the housing includes grooves suitable for receiving the cable;

at least some of the grooves are shaped so as to receive the cable fully, in such a manner that the ridges between said grooves protect the cable against possible rubbing;

the grooves are formed by spaces left empty between ribs formed on the outside face of the housing; and

the housing is obtained by injection moulding a thermosetting material such as epoxy resin, phenolic resin, polycarbonate, polyurethane, polyamide, vinyl ester, polyester, or a thermoplastic material having a melting temperature that is sufficiently high, such as polyphthalamide (PPA).

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The invention will be better understood on reading the following description given purely by way of example and made with reference to the drawings, in which:

Figure 1 is a diagram of the front of a vehicle seen from the side and provided with a device of the invention;

Figure 2 is a detailed diagram of the device shown in Figure 1;

Figure 3 is an axial section diagram of a wheel of the vehicle shown in Figure 1 provided with a device of the invention;

Figure 4 is a radial section diagram of the wheel shown in Figure 3; and

Figure 5 is a detailed diagram in longitudinal section of the device shown in Figure 2.

#### DETAILED DESCRIPTION OF THE EMBODIMENT

[0019] Figure 1 shows the front of a vehicle, given overall reference 10. The vehicle 10, which is a car in the example shown, has assemblies each constituted by a wheel 14 carrying a tire 16, with only the front-right assembly 12 being shown.

[0020] When mounted on the car 10, the assembly 12 is located in a wheel arch 18.

[0021] The vehicle has an antenna 20 situated in the vicinity of the wheel arch 18 and designed to interact with a member 22 carried by the wheel 14.

**[0022]** The member 22 which is shown in detail in Figure 2 comprises a pressure sensor 24 coupled to a transmission and/or reception device 26. The transmission and/or reception device 26 comprises electronic transmitter and/or receiver means 28 together with an antenna 30.

**[0023]** The pressure sensor 24 and the electronic transmission and/or reception means are integrated in a housing 32 having an outside face 34 that supports the antenna 30. The housing is of elongate prismatic shape and is fixed in an assembly groove of the wheel 14 so that its long dimension extends substantially along an ortho-radial axis of the wheel 14, as can be seen in Figures 3 and 4.

**[0024]** The antenna 30 is constituted by a cable 36, for example made of copper, which is wound around the housing 32 so as to form a solenoid, and when the device 26 is mounted on the wheel 14, the solenoid is oriented along an ortho-radial axis of the wheel 14.

**[0025]** In order to protect the cable 36 while the tire is being mounted on the wheel, the outside face 34 of the housing includes grooves 38 as shown in Figure 5, these grooves being shaped to receive the cable fully, so that the cable is thus protected against being rubbed by the ridges between said grooves.

**[0026]** The grooves 38 are formed by spaces left empty between ribs 40 formed on the outside face 34 of the housing 32.

**[0027]** In order to improve protection of the cable, an outer protective film 42 of heat-shrink material covers the outside face of the housing.

**[0028]** In an alternative way, the protection of the loops of the antenna can be obtained by moulding, for example by injection moulding, of the assembly housing and antenna. The material constitutive of the moulded layer can be identical to the material of the housing.